of the sun, and diminished gradually until it disappeared on the southern edge of the cloud. It was, when complete, a perfect circle of white light, with the centre quite black, but not thick enough to prevent the sun being seen. The phenomenon lasted from 11·39 to 12·15, and was noticed at the Paris Observatory.

AMERICAN papers state that an earthquake at Guadalajara, Mexico, on the 11th of February, damaged houses and churches. The Seboruco volcano at the same time was in a violent state of eruption. The shocks extended to San Cristabal, where houses were destroyed, and several persons were killed.

FOR the protection of vineyards against frost in spring, the production of large artificial clouds of smoke is a common appliance in France and Germany. We now hear of a new method in this operation, recommended by M. G. Vinard. It is easily executed, and has proved successful; it consists in carefully mixing gas-tar with sawdust and old straw, and piling up this mixture into large heaps in the vineyards. The mixture remains easily inflammable, in spite of rain and weather, for more than a fortnight. When required for use, smaller heaps are made from the large ones, of about two feet in diameter, and are distributed in and round the vineyard. If there is little wind these heaps burn freely for about three-and-a-half hours, and produce a very dense smoke. The artificial cloud which thus enwraps the vines considerably decreases the radiation from the ground, and with it counteracts frost, which is greatest towards morning during calm spring nights, and which does so much harm to the plants.

IT is proposed—in fact steps have been taken—to acclimatise the Florida Cedar in Bavaria. The superiority of the wood of this tree (*Juniperis Virginiana*) over all other kinds of cedar, is well known, and the demand for the wood in Bavaria, where immense quantities of lead-pencils are made, has induced some manufacturers to take up the question of the acclimatisation of the tree in that country. Seeds have been sown in the Royal Forest, and about 5,000 young plants have been grown on one private estate: the cultivation of the tree is also being attempted in other parts of Germany.

IN a farm in the State of Nevada (U.S.), near the River Larson, there is a troop of twenty-six camels, all of which, with the exception of two, have been reared there. A few years ago nine or ten of these animals were imported into America, but only two survived; and these two, being fortunately a male and female, have produced twenty-four, all of which are now alive. The soil is sandy and sterile in the extreme, and the animals thrive well, although their only food consists of the prickly leaves of a small shrub, and bitter herbs which cattle will not touch. They are employed to carry merchandise, and perform considerable journeys across a very barren country.

A RECENT number of the *Courrier* of Jonzac reports that a meteorite was seen falling on a field in the Island of Oleron, and is believed to be a part of the meteor which was seen at so many places on the 10th of February last. The circumstances of the fall will be investigated carefully.

A METEOR was not only seen but actually caught at Orleans on the 9th inst. A small mass of pyritous substance was discovered in one of the streets, at the very place which had been struck by an immense flame a few seconds before. The pieces were divided among bystanders anxious to secure the possession of the smallest fragment of such a celestial object; but it is hoped some of the possessors will be intelligent enough to get a specimen sent to the Academy of Sciences.

ASTRONOMICAL and meteorological subjects are beginning to interest the French public. Two of the most influential Parisian papers, the *Temps* and the *Siècle*, publish daily, with comments, the weather forecasts of the Observatory.

WE may expect soon to see every large town in the kingdom in possession of an aquarium. A very fine one has quite recently been completed at Southport, a description of which we are able to give in to-day's NATURE; the foundation-stone of the Westminster establishment will be laid in a week or two; a scheme for the construction of an aquarium at Plymouth is maturing; an aquarium and winter garden is talked of at Edinburgh; a bill is before Parliament for the purchase of a site at Scarborough for an aquarium; and we have every reason to hope that Birmingham will soon be able to count one among its many other educational institutions. In a recent lecture at the last-mentioned town by Mr. W. R. Hughes, F.L.S., on Aquaria, the lecturer pointed out very forcibly how valuable such institutions might be made as a means of education. That gentleman deserves great credit for the trouble he has taken to obtain full information concerning the history and management of aquaria, and under his guidance we should think an aquarium at Birmingham ought to be second to none in the kingdom.

WE are glad to see from several numbers of the *Huddersfield Chronicle* which have been sent us, that the Huddersfield Naturalists' Society is in a healthy working condition. The members are evidently successfully investigating the natural history of their district, and from the reports of papers read and the discussions thereon, we judge that a considerable proportion of the members take a share in the business of the Society.

THE additions to the Zoological Society's Gardens during the past week include two Vervet Monkeys (*Cercopithecus lalandii*) from South Africa, presented by Mrs. A. Thornley; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. H. Edwards; a Chimpanzee (*Troglodytes niger*) from West Africa; two Indian Muntjacs (*Cervulus muntjac*) from India, deposited; a Yellow-bellied Liothrix (*Liothrix luteus*) from India, purchased; two Hairy Armadillos (*Dasypus villosus*), born in the Gardens.

SCIENTIFIC REPORT OF THE AUSTRO-HUNGARIAN NORTH POLAR EXPEDITION OF 1872–74 *

II.

MAGNETIC disturbances are closely connected with the Auroræ; while in temperate zones they are the exception, they form the rule in Arctic regions, at least the instruments are almost in constant action. This is the case for the inclination, declination, and intensity needles. As long as the vessel was drifting, *i.e.* until October 1873, the fixed variation instruments could not be used; absolute determinations with Lamont's magnetic theodolite were made, and several "magnetic journals" (only declination-readings) were kept, but already when near Nowaja Semlja, Lieut. Weyprecht found out that on account of the constant disturbances these readings were of very little value, as they could not be compared with simultaneous readings of the variation-instruments. In November, as soon as it was ascertained that the ice-field which enclosed the ship had come to a standstill, Lieut. Weyprecht had snow-huts constructed in which he fixed the variation-instruments, the magnetic theodolite, the inclinometer for the absolute determinations, and the astronomical instruments. The three variation-instruments for declination, horizontal intensity, and inclination had been furnished to the expedition by Prof. Lamont, director of the Munich Observatory.

After one day's work it was found already that the former methods of observation, *i.e.* simple readings at certain hours, are of no value whatever in Arctic regions, as they represent solely the accidental magnitude of the momentary disturbance. These neither give any true mean result, nor do they correctly represent the action of the needles. All intervals, which were observed for such readings at former expeditions, are absolutely useless, lying far too widely apart to permit of correct conclu-

* Die 2. Oesterr.-Ungarische Nord Polar Expedition, unter Weyprecht und Payer, 1872–74. (Petermann's Geogr. Mittheilungen, 1875; heft ii.)

(Continued from p. 368.)

sions as to the general magnetic conditions. Under these circumstances Lieut. Weyprecht resolved to proceed very differently: upon every third day he let observations be made every four hours all the day long, and had the readings taken for every minute during one whole hour at a time; on each day different hours were chosen for the readings. Besides this, in order to get an idea as to the whole daily course, he made observations every five minutes during twenty-four hours, twice a month. With a view to make all observations as simultaneous as possible, the readings were taken immediately after one another (generally within eight to ten seconds), the telescopes of the three instruments being all fixed upon the same axis. These observations were continued from the beginning of January to the end of April 1874, comprising altogether thirty-two days of observation; Lieut. Weyprecht believes that when tabulated, their results will give a true representation of the unceasing changes with regard to direction and intensity of magnetic force in Arctic regions. In order to confirm the connection between the auroræ and the action of the needles, a second observer, independently of the others, observed the changes and motion of the auroræ. Absolute determinations of the three constants were made as often as circumstances permitted, to control the variation-instruments.

Apart from the Swedish Expedition, whose observations are not yet published, Lieut. Weyprecht points out that his are the first regular and simultaneous observations that were ever made in the Arctic districts. Moreover, he thinks that all former observations were made with the ordinary heavy needles, and that he was the first to use the light Lamont needles. For observations, however, under such conditions as the normal ones near the pole prove to be, heavy needles are perfectly useless; even the comparatively light intensity-needle of Lamont's theodolite oscillated so violently, on account of its unproportionally great moment of inertia, and even with moderate disturbances, that the readings became quite illusory. Almost on each magnetic day some disturbances were so great that the image of the scales could no longer be brought into the field of the telescopes on account of deflection; in order to ascertain even these maximal phenomena, Lieut. Weyprecht constructed an apparatus by which he could at least measure them approximately. He owns that as a matter of course his observations could not possibly be as perfect as those made at home, but thinks that it will be easy to modify Lamont's instruments on the basis of his experiences, so that with a future expedition, where there is a greater staff of observers, results could be obtained of any desired exactness. Altogether Lieut. Weyprecht's party of observers, consisting besides himself only of Lieut. Brosch and Ensign Orel, have taken about 30,000 readings from their different magnetic instruments, and the principal results are the following:—

The magnetic disturbances in the district visited are of extraordinary frequency and magnitude. They are closely connected with the Aurora Borealis, the disturbances being the greater, the quicker and the more convulsive the motion of the rays of the aurora, and the more intense the prismatic colours. Quiet and regular arcs, without motion of light or radiation, exercise almost no influence upon the needles. With all disturbances the declination needle moved towards the east, and the horizontal intensity decreased, while the inclination increased. Movements in an opposite sense, which were very rare, can only be looked upon as movements of reaction. The ways and manner of the magnetic disturbances are highly interesting. While all other natural phenomena became apparent to our senses, be it to the eye, ear, or touch, this colossal natural force only shows itself by these scientific observations, and has something mysterious and fascinating on account of its effects and phenomena being generally quite hidden from our direct perception.

The instrument upon which Lieut. Weyprecht placed the greatest expectations, namely, the earth-current galvanometer, gave no results at all, through the peculiar circumstances in which the explorers were placed. He had expected to be able to connect the auroræ with the galvanic earth-currents. But as the ship was lying two-and-a-half German miles from land, he could not put the collecting plates into the ground, but was obliged to bury them in the ice. Now, as ice is no conductor, the plates were isolated, and the galvanometer needle was but little affected. Prof. Lamont had supplied these excellent instruments also; the conducting wires were 400 feet long. Later on, Lieut. Weyprecht tried to obtain some results by connecting a collector for air-electricity with the multiplier of the galvanometer, but failed, doubtless for the same reason.

The astronomical observations while the ship was still drifting were confined to determinations of latitude and longitude, the latter by chronometers and correction of clocks, by lunar distances, as often as opportunity served. In this only a sextant and a prism circle with artificial horizon were used. When the ship was lying still, a little "universal" instrument was erected, and the determinations of time, latitude, and azimuth were made with this. The longitude was calculated from the mean of as many lunar distances as could be observed during the winter; they were 210 in number. The azimuth of a basis of 2,171 metres long, measured by Lieut. Weyprecht with a Stampfer levelling instrument, was determined with the universal instrument of the magnetic theodolite. All this work was done by Ensign Orel, Lieut. Weyprecht only taking a share in measuring lunar distances. The determinations of locality were made without regard to temperatures; if the mercury of the artificial horizon was frozen, blackened oil of turpentine was used instead.

Of the results of the meteorological observations, only some general ideas can be given, as here figures alone decide. They were begun on the day the explorers left Tromsö, and were only discontinued when they left the ship; thus they were made during twenty-two months. Readings were taken every two hours, and also at 9 A.M. and 3 P.M., therefore fourteen times daily. The observers were Lieut. Brosch, Ensign Orel, Capt. Lusina, Capt. Carlsen, Engineer Krisch (from autumn 1872 till spring 1873), and Dr. Kepes (during the last two months only). The direction as well as force of winds were noted down without instruments. Lieut. Weyprecht thinks this method by far the best in Arctic regions, as errors are more or less eliminated, while when using instruments the constant freezing, drifting snow, &c., produce errors that cannot be determined nor controlled; besides, anyone who has been to sea for a short time will soon acquire sufficient exactness in these observations.

Until the autumn of 1873 winds were highly variable. In the vicinity of Nowaja Semlja many S.E. and S.W. winds were observed; in the spring these veered more to N.E. A prevalent direction of winds was only recognised when in the second winter the expedition was near Franz-Joseph's Land. There all snowstorms came from E.N.E., and constituted more than 50 per cent. of all winds. They generally produced clouded skies, and the clouds only dispersed when the wind turned to the north. The explorers never met with those violent storms from the north, from which the *Germania* party had so much to suffer on the east coast of Greenland, and which seem to be the prevalent winds in the Arctic zone. Altogether, they never observed those extreme forces of wind which occur regularly in our seas several times in every winter (for instance, the "Bora" in the Adriatic). Every Arctic seaman knows that the ice itself has a calming effect upon the winds; very often white clouds are seen passing with great rapidity, not particulary high overhead, while there is an almost perfect calm below.

One peculiarity must here be mentioned. Lieut. Weyprecht made the remarkable discovery that the ice never drifted straight in the direction of the wind, but that it always deviated *to the right*, when looking from the centre of the compass; with N.E. wind it drifts due W. instead of S.W.; with S.W. wind it drifts due E. instead of N.E.; in the same manner it drifts to the north with S.E. wind, and to the south with N.W. wind. There was no exception to this rule, which cannot be explained by currents nor by the influence of the coasts, as with these causes there would be opposite results with opposite winds. Another interesting phenomenon in both years was the struggle between the cold northern winds and the warmer southern ones in January, just before the beginning of the lasting and severe cold; the warm S. and S.W. winds always brought great masses of snow and produced a rise in the temperature amounting to 30–35° R. within a few hours.

Little can at present be said on the result of the barometer readings, without a minute comparison of the long tables of figures, although very extreme readings occurred at times. The explorers had three mercury and four aneroid barometers; by way of control, Ensign Orel took the readings from five of these instruments every day at noon, while the intermediate observations were made with an aneroid.

The thermometers were suspended about four feet from the surface of the snow, in the open air, and perfectly free on all sides, about twenty-five yards from the vessel. Excepting the maximum thermometers, they were all spirit thermometers, made by Cappeller of Vienna. They were often compared with a very exact normal thermometer of the same make. Readings from a minimum thermometer were noted daily at noon; during the

summer a black bulb thermometer was exposed to the rays of the sun; during the winter frequent observations were made with exposed and covered minimum thermometers to ascertain the nightly radiation at low temperatures. In both winters February was the coldest month, while January both times showed a rise in the temperature when compared either with December or February. In winter the temperature was highly variable, and sudden rises or falls were frequent; in the three summer months, however, the temperature was very constant, and changes very rare. July was the warmest month. The lowest reading was $-37\frac{1}{2}^{\circ}$ R. (nearly -47° C.) The influence of extremely low temperatures upon the human body has often been exaggerated; there are tales of difficulty in breathing, pains in the breast, &c., that are caused by them. Lieut. Weyprecht and his party did not notice anything of the kind; and although many of them had been born in southern climes, they all bore the cold very easily indeed; there were sailors amongst them who never had fur coats on their bodies. Even in the greatest cold they all smoked their cigars in the open air. The cold only gets unbearable when wind is united to it, and this always raises the temperature. Altogether, the impression cold makes upon the body differs widely according to personal disposition and the quantity of moisture contained in the air; the same degree of frost produces a very uncomfortable effect at one time, while at another one does not feel it.

To determine the quantity of moisture in the atmosphere, an ordinary psychrometer, a dry and a wet thermometer, were used. But the observations with these instruments are not reliable at low temperatures, and had to be given up altogether during winter, as the smallest errors give great differences in the absolute quantity of moisture in the air. In order to determine approximately the evaporation of ice during winter, Lieut. Weyprecht exposed cubes of ice that had been carefully weighed to the open air, and determined the loss of their weight every fourteen days.

(*To be continued.*)

PRIZES OFFERED BY THE BELGIAN ACADEMY

THE following subjects for prizes to be awarded in 1866 have been proposed by the Royal Academy of Sciences, Belgium:—

1. To improve in some important point, either in its principles or applications, the theory of the functions of imaginary variables.

2. A complete discussion of the question of the temperature of space, based upon experiments, observations, and calculation, stating the grounds for the choice made between the different temperatures attributed to it.

Competitors should observe that the above question, stated in the most general terms, is connected with the knowledge of the absolute zero, definitely fixed at $-272^{\circ}\cdot85$ C., but that a historical and analytical inquiry into researches undertaken, previous to about 1820, to resolve this question, would offer a real scientific interest. Particular attention is called to the works of the end of the eighteenth century and the commencement of the nineteenth; among others, those of Black, Irvine, Crawford, Gadolin, Kirwan, Lavoisier, Lavoisier and Laplace, Dalton, Desormes and Clément, Gay-Lussac, &c. Note also the temperature, -160° C., which Person indicates; according to his formula, which connects the latent heat of fusion with specific heats, this number would represent the absolute zero. As it comes near to that given by Pouillet, it will be important to discover what is its signification, its import (*sens*), or its exact physical value.

3. A complete study, theoretical and, if necessary, experimental, of the specific absolute heat of simple and of compound bodies.

4. New experiments on uric acid and its derivatives, chiefly from the point of view of their chemical structure and their syntheses.

5. New researches into the formation, the constitution, and the composition of chlorophyll, and into the physiological *rôle* of that substance.

6. To expound the comparative anatomy of the urinary apparatus in the vertebrates, basing it on new organogenic and histological researches.

The prize for the first, the fourth, and the sixth questions will be a gold medal of the value of 800 francs, the prize for the fifth will be of the value of 600 francs, and the prize for the second and third questions will be of the value of 1,000 francs.

The memoirs must be legibly written, either in French, Flemish, or Latin. They should be addressed, carriage-paid, to M. J. Liagre, Perpetual Secretary of the Academy, at the Museum, before August 1876; any received after which will be out of the competition.

Authors must not put their names to their works. Only a motto must be attached, and the same written outside an envelope enclosing the author's name and address. This condition is indispensable.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, March 11.—Prof. H. J. S. Smith, F.R.S., president, in the chair.—Mr. Roberts gave an account of his paper on a simplified method of obtaining the order of algebraical conditions.—Prof. Sylvester, F.R.S., then spoke on "an orthogonal web of jointed rods, a mechanical paradox." If two sets of points be taken respectively in two lines perpendicular to each other, either in a plane or in space, and a *linkage* be formed by connecting each point in one set with each point in the other by jointed rods, this constitutes what the author means by an orthogonal web. It is *not* a fixture, and its motion is subject to this curious condition, that either each set of points must always continue to lie in the same right line, which may be called a neutral position, or else one set will lie in a right line and the other in a plane at right angles to such line. Starting from the neutral position (or position of *double-lock*), the system may be said to be subject to an optional locking about one or the other of the two perpendicular lines, and an unlocking about the other, but when once put in motion the system must be again brought into the same or a new neutral position before the one axis of lock can be got rid of, and another at right angles thereto substituted in its stead. If the whole motion be confined to a plane, the paradox consists in the link-combination possessing one degree of liberty of deformation (αλλοιωσις as distinguished after Plato from κινησις), although a calculation of the amount of restraint by the general method applicable to such questions would seem to indicate that it *ought* to form an absolutely rigid system except in the case where there are only two joints in one at least of the two sets. Taken in space there is the further and more striking paradox that the number of degrees of liberty of deformation according to the choice made of one or the other of the two sets of points to be unlocked out of the rectilinear into the planar position will be the *alternative* of two numbers, viz. the number of joints in the one set or in the other set (which need not be the same), a kind of indeterminateness in the "index of freedom" without precedent in kinematical speculations. As lightning clears the air of impalpable noxious vapours, so an incisive paradox frees the human intelligence from the lethargic influence of latent and unsuspected erroneous assumptions. Paradox is the slayer of prejudice.—The Secretary, in the author's absence, then read a portion of Mr. G. H. Darwin's paper on some proposed forms of slide-rule. The object of the author was to devise a form of slide-rule which should be small enough for the pocket and yet be a powerful instrument. The first proposed form was to have a pair of watch-spring tapes graduated logarithmically, and coiled on spring bobbins side by side. There was to be an arrangement for clipping the tapes together, and unwinding them simultaneously. Two modifications of this kind were given. The second form was explained as the logarithmic graduation of several coils of a helix engraved on a brass cylinder. On the brass cylinder was to fit a glass one, similarly graduated. To avoid the parallax due to the elevation of the glass above the other scale, the author proposed that the glass cylinder might be replaced by a metal corkscrew sliding in a deep worm, by which means the two scales might be brought flush with one another.

Anthropological Institute, March 9.—Col. A. Lane Fox, president, in the chair.—Sir Duncan Gibb read a paper on Ultra Centenarian Longevity, in which he exhibited some tables giving eighty-four instances of the reputed age of 107 to 175 years, a certain proportion of which he considered he had grounds to believe to be correct. Of nine living centenarians whom he had previously examined for physiological purposes, he now added a tenth—the Tring centenarian—who died recently in her 112th year. The correctness of her age was considered